

fications of the forces which act upon it. The desired unity, then, was far from being realised before the appearance of that repulsive force acting at a distance which the cometary phenomena definitely inscribe in the mechanism of the heavens by the side of attraction, and which I find around us in the phenomena of heat.

At all events, we have got a great way from that judicial astrology which I felt bound to remind you of at the outset, in order to show to you the condition in which we found that branch of celestial science. While, in planetary astronomy, scarcely anything has been done for two hundred years but to develop indefinitely the mathematical formulæ of a force established and defined, we have tried here to put ourselves on the track of a force which rules more especially the cometary world, and have endeavoured to give it a name.

THE AMERICAN OYSTER-TRADE

SOME notion of the extent of the trade in oysters at Baltimore may be gathered from a recent report of the British Consul. Baltimore, it is said, is recognised all the world over as the great centre for raw oysters—New York as well as the Southern and Western States depending on it for their supplies. The packing-houses in Baltimore have agencies in all the large cities and towns, and these agencies have sub-agencies covering the country districts. About twenty firms are engaged in the packing and distribution throughout the States of raw oysters, 5,000,000 bushels of which are annually consumed to meet the demands of the trade, which is one not only incurring great risks, but also requiring some tact for its successful management. Such is the perishable nature of the oyster that the risk in handling them has much to do in determining their price. Delays in the arrival of a vessel will often cause a whole cargo to become putrid, so that it has at once to be thrown overboard. To cover these risks the margin of profit is necessarily large. Large numbers of men, women, and children are employed in opening the oysters and removing them from their shells: for this work they receive 20 cents per gallon, and the average earnings of each person are about two dollars per day of ten hours.

In packing the raw oysters they are, after being opened, washed carefully, then placed in flat cans with a little fresh water, as the liquor or natural juice of the oyster decomposes in twenty-four hours after exposure. These cans are then packed in rows with cakes of ice between them, and shipped by express to their destination. At certain points it is arranged that these cases destined for the far west shall be opened, fresh ice placed between the cans, and then re-shipped to their ultimate destination. Oysters packed in this way and re-iced at certain places on the route can be sent from Baltimore to San Francisco in good condition. Besides this trade in raw oysters as many as 3,000,000 bushels are annually steamed and hermetically sealed in tins for shipment to all parts of North America and to Europe. The season lasts from Oct. 1 to April 1. By the steaming process the oysters are so preserved that after being sealed down they will keep good for an indefinite period of time.

RUDE STONE MONUMENTS OR CHAMBERED BARROWS

I.

THE object of the present and succeeding articles is to discuss some of the opinions which are held by some of the leading antiquaries of the present day with respect to the construction, destination, and also antiquity of these monuments, and to show that, notwithstanding all the advantages presented by the establishment everywhere of Archæological Societies, the publica-

tion of their journals, and the increased facilities for travelling, many professed students of this branch of science are still found to be blindly adhering to the views of antiquaries of the past century. There is a very remarkable contrast between the progress made in the study of unchambered, and in that of chambered, barrows. We have now a much sounder knowledge of the former than of the latter, not simply because the latter are more difficult to understand, but because their study requires qualifications not possessed by every investigator. He must have long acquaintance with the monuments, sufficient dexterity in drawing and surveying to make accurate plans, sections, and elevations, be a close and unbiassed observer, and then have leisure to devote his intelligence to the scrutiny. cursory examination will be always fatal to the acquisition of sound knowledge, and serve to mislead others; and it is greatly to be feared that this has been too common a habit and result.

The first erroneous opinion to which attention is now directed is that very many of the cromlechs or dolmens (to employ terms which are in general use), i.e. rude stone structures which in the British Islands and on the Continent are partially or wholly exposed to view, were never in any other condition; that is to say, that although they may be in some measure dilapidated now, yet that they were originally intended to be exposed buildings. They are aware that many other structures of analogous forms are imbedded or enveloped in mounds so as to be invisible externally, but they will not allow that the exposed ones ever were so. As long as these authors confine themselves to the bare declaration of their belief their position is not so assailable; but when they point to the monuments which they say illustrate their arguments the case is altered. The examples are open to the inspection and consideration of everybody, and the accuracy of their descriptions can be tested. This has been done, and the result has been that numberless inaccuracies have been detected in the published accounts and in the plans; and the conclusions which have been deduced from them are consequently pronounced to be erroneous.

It will be sufficient to point out this in a few of the well-known monuments to which they have directed our attention; and as no author has treated the subject so comprehensively as Mr. Fergusson, or been so methodical in the arrangement and classification of the monuments, his recent work* will be particularly referred to in the following pages. He has admitted that he is indebted for much of his information to the published accounts of others. It must be premised that we do not assert there is positive *proof* of the former existence of the mounds, nor do we say that there is any tradition of them, but we say that when the exposed monuments are compared with those which are wholly enveloped, and with those numberless instances in which the traces, in many examples very extensive traces, of the mounds still exist, the fair and legitimate inference is that these so-called "free-standing" structures† were once monuments of the same class as the others, and that they are only in a more advanced stage of decay at the present time.

We go a step further, and say that there are so very few instances in which no trace whatever of a mound remains that the argument from inference is greatly strengthened. Have the advocates of the theory ever attempted to sum up *carefully* all the examples of total denudation? It has been remarked by the author of "Rude Stone Monuments in all Countries," p. 44, that "probably at least one hundred dolmens in these islands could be enumerated which have not now a trace of any such envelope." There is a confidence in this statement which invites scrutiny, and we venture to say at the outset that it is far from being accurate, for we know that

* "Rude Stone Monuments in all Countries, their Ages and Uses."

† These are defined to be dolmens which were never intended to be hidden in any earthen covering, and about which no trace of a mound exists.

traces of mounds which in some instances no longer exist are upon record, and there is no reason for doubting the record. Immediately following the above statement, a well-known monument is brought forward as one of the unmistakeable hundred examples, and the remark is made that Kits Cotty House, near Aylesford, in Kent, "is exactly now where it was when Stukeley drew it in 1815, and there was no tradition then of any mound ever having covered it," and "we cannot now find a trace of it." But if we pass on to p. 116, where the monument is again mentioned, we find it said, "If we can trust Stukeley's drawing, it was an external dolmen standing on the end of a low long barrow," "the mound has since been levelled by the plough," and "I am inclined to place faith in the drawing." There is no tradition, it is true, of any mound having covered it, but how any faith can be put in the drawing, and yet it can be said that the mound has been levelled, which, it is implied at p. 44, never existed, is beyond comprehension. According to Stukeley, therefore, there was not only a trace of the mound, but its form was in his time determinable, and the stone chamber was situated near one of its extremities. This agrees admirably with the construction of many other chambered long barrows where we see the chamber either wholly or in great part enveloped. This monument, therefore, should not be included among the obvious hundred examples.

Pentre Ifan, in Pembrokeshire, is also brought forward by the same author as another remarkable example in support of the "free-standing" theory. He describes it very briefly and inadequately in pp. 168, 169, and compares it with those which "were, or were intended to be, covered with mounds." There is, he thinks, a very wide difference between it and them, for the latter, he admits, are enclosed sepulchral chambers, whereas as regards the former it never could have been erected to be hid, and "besides that, the supports do not and could not form a chamber. The earth would have fallen in on all sides," &c. Unquestionably there would be much to favour the theory, if it could be granted that the monument is in the same condition now as it always was; but it is known for certain that this is not so. There is, fortunately, a description of it written by Owen more than 200 years ago, and there is also another account by Fenton as it appeared in his day, about seventy or eighty years since, and from these we learn that the aspect of the monument was totally unlike what it is now. There were then eight or nine upright stones under the great roofing stone, now there are only three; then there were the remains round about it of a stone circle 50 ft. in diameter, not now existing; and according to the late Rev. H. Longueville Jones, there were traces, when he saw it, of the original mound. Of the eight or nine upright stones, two, or at most three, supported the capstone, which will easily account for the removal of those which gave it no support. So that in this instance, also, here is a monument which should be excluded from the hundred examples.

On a careful inspection of Plas Newydd, another of the hundred, it will be found that there is evidence both of the encircling ring of stones and of a mound.

It would not be necessary to enter into these particulars but for the oft-repeated assertion of Mr. Fergusson, "no trace of the mound can now be found either around the stones or in the neighbourhood," which is expressed in various ways, and by which he conveys the impression that no mound ever existed; and for the argument which this belief is made to sustain, an argument which we think strongly militates against the idea that all these monuments were destined for sepulchral purposes.

Before passing on to monuments of other lands it will be well to point out the error of one who, with every desire to advance archæological science, has been misled by the classification adopted by Mr. Fergusson. It will not be out of place to do so here, because the views of the

writer of the present article have been assailed* by this young Cornish antiquary, who has been carried away by his zeal. In order to give support to the "free-standing" theory he enters into a description of Lanyon Quoit, a dolmen standing in the parish of Madron, Cornwall, which he thinks fully establishes it, an opinion shared by Mr. Fergusson (p. 163). But Capt. Oliver, R.A.,† has convincingly shown that the monument is not now in the condition in which it used to be; that it has been rebuilt and the position of its supporters have been altered; that these original supporters were stout stone slabs (4 ft. wide by 1 ft. 6 in. thick), and not slim pillars; that whereas there are now three, there were four upright slabs in old Mr. Borlase's time; that two more slabs are lying prostrate close to the others, which it is fair to presume were once upright walling stones of the chamber; and that the monument stands as much *in as on* a long mound, which bears every appearance, he adds, of having been a long barrow. It ought therefore to be struck off the list also.

Arthur's Quoit, in Gower, according to Mr. Fergusson, was probably always "free-standing;" but both Sir Gardner Wilkinson ("Archæologia Cambrensis," 1870) and the Rev. E. L. Barnwell have expressed the contrary opinion. The former believes it to have been covered with a tumulus, and the latter writes, "there are cart-loads of stones still remaining, and so little disturbed in position that their outline gives that of the base of the once existing mound." This monument therefore may rightly be excluded from the list.

The elder Borlase describes very accurately all the most remarkable exposed monuments existing in Cornwall in his day, and speaks of the traces of their mounds in every case, e.g. Mulfra Quoit, in the remains of a stone barrow; Bosporthenis Cromlech, once in a mound of stones and earth; and Zennor Cromlech, once in a stone barrow.

According to Norden, who described Trevethy Cromlech in 1610, it was "standing on a little hill within a feilde."‡ Lower Lanyon chamber was discovered in 1790 in a bank of earth and stones; and only one upright stone and the fallen capstone now remain. Pawton Cromlech is still partly "buried in the tumulus which no doubt formerly covered the whole" ("Nenia Cornubia," p. 32). Chywoone or Chûn Cromlech was in a barrow or cairn, 32 ft. in diameter (ibid., pp. 56, 58), and the author of this book says that it so closely resembles a dolmen at Moytura, Ireland, and another at Halskov, in Scandinavia, that the drawings of one might pass for those of the other two. This is a repetition of Mr. Fergusson's remark§—the monument "at Halskov is so like the dolmen and circle represented in woodcut 61 that the one might almost pass for the other."

The "free-standing" theory receives no support whatever from the monuments of the Channel and Scilly Islands, nor yet from those of the Isle of Man, so that the area of the British Isles is circumscribed within which the more than hundred examples are to be found. England, Wales, Scotland,¶ and Ireland contain a large number of rude stone monuments, and the area is sufficiently wide to produce as many as Mr. Fergusson supposes. But it would be a most difficult—we should say a hopeless—task for anyone to attempt to enumerate them and to hand in the required tale.

The writer of the present article has examined the group of monuments known as those of Beni-Messous, or El-Kalaa, in Algeria, and planned several of them. They are all of similar construction, and are simple cists, averaging about 7 ft. by 2 ft. 6 in. (internal dimensions)

* NATURE, vol. viii. p. 202.

† Ibid. p. 344.

‡ For account and drawings see "Nenia Cornubia," pp. 45, 47.

§ Op. cit., pp. 304, 305.

¶ At p. 240, Mr. Fergusson says—"The free-standing dolmens are few and far between, some half-dozen for the whole country," which again diminishes the area.

without galleries. These cists point east and west, with slight variations, and are built with unhewn stones of the locality—tufa and pudding-stone. The mounds, which in a few instances remain intact, are small and of stone, and the chambers which are visible are in various stages of dilapidation and exposure, traces of the mounds being clearly indicated by the quantity of loose stones which are round about them. The place has served for many years as a convenient quarry for the Trappist monks of Staouli, and for the French colonists who have located themselves at Guyotville and Cheragas. If it had not been for a Government order the whole of these monuments would have been carted away for the sake of their building materials. When first discovered they are said to have numbered about 100; about 30 are now left. They are scattered over an area of a few acres, and are arranged without any regularity; and at the period of their completion must have presented a remarkable collocation of stone heaps. The late M. Berbrugger, who was Inspector-General of Historical Monuments in Algeria, was the first to make their existence known, about thirty-seven years ago. Dr. E. Bertherand, the present secretary of the Algerian Acclimatisation Society, has described them in a pamphlet printed by that Society. In 1859 Mr. A. H. Rhind communicated an article upon them to the Society of Antiquaries, London, which is printed in "Archæologia," vol. xxxviii. M. René Galles, the well-known explorer of Brittany dolmens, has also written about them; and the late Mr. J. W. Flower, who visited the spot in 1868, has compiled an article from the foregoing pamphlets, which he read at the International Congress of Prehistoric Archæology held at Norwich in the same year. All these writers have classified them as covered and uncovered tombs, implying, if not asserting in so many words, that the latter had never been covered; *i.e.* "free-standing." Mr. Fergusson has followed their lead, and adopted their classification; but a careful inspection of each exposed monument will convincingly prove that the stone heaps which surround them strongly testify against the theory.

When, however, our attention is directed by Mr. Fergusson to continental examples our astonishment at the glaring inaccuracies and contradictory statements is increased, and we wonder that several well-known monuments should have been brought forward to support a theory which their prominent features most clearly refute. There are two in the south of Brittany which have been described by him as belonging to the uncovered class, *viz.* Dol-ar-Marchand at Locmariaker, and Courconno, in the parish of Plouharnel. Of the latter, he says, "it certainly never was covered up" (p. 343). This is a plain and positive assertion; yet a few pages further on (p. 363) he writes doubtfully, if not contradicting, on this point: it is "a magnificent cist, walled with rude stone, and such as would form a chamber in a tumulus if buried in one, though whether this particular example was ever intended to be so treated or not is by no means clear." Of the former he writes, it is "the most interesting, if not the finest, free-standing dolmen in France," and "the great stone, like that of most free-standing dolmens, rests on three points, their architects having early learned how difficult it was to make sure of their resting on more. So that, unless they wanted a wall to keep out the stuff of which the tumulus was to be composed, they generally poised them on three points, like that at Castle Wellan."

The question bears quite another aspect, however, when these monuments are carefully inspected, and the treatment they have received at the hands of the inhabitants of late years is inquired into. We thus ascertain that the great dolmen of Courconno is in a very different state now from what it was in 1847, when drawn and described by Cayot-Delandre, the historian of the Morbihan, and that it has been further curtailed of its proportions since 1854. It was then not a mere cist of gigantic size but a huge

chamber to which a long covered way or passage was attached, the dimensions of which are given; and there were also traces of the enveloping mound, some of which still exist.

So, too, with regard to the great dolmen of Dol-ar-Marchand, it is not at all as described by Mr. Fergusson. Its chamber has also a long covered way attached to it, which fact he does not mention; both the chambers and the covered way are buried to a depth of several feet in the remains of a circular mound which can be measured; and regular walls line the chamber and the covered way for the express purpose of keeping out the earth composing the tumulus. All these features are incontestably visible. These monuments, therefore, do not sustain the theory.

There are other well-known examples of exposed monuments in France, respecting which a great deal might be written to invalidate the "free-standing" theory. The above will be sufficient to show upon what a weak and indefensible basis it rests.

The theory is supposed, however, to receive the strongest support from a singular monument near Confolens, near St. Germain-sur-Vienne, which is also thought to have been erected as late as the tenth or eleventh century of the Christian era. It is considered of such great importance that it has been engraved and stamped in gold upon the cover of the book which has been so often referred to. It will not be right, therefore, to pass it by. The monument is really a remarkable one, and merits a most careful study on the spot. Owing to its situation in a most out-of-the-way part of France, which entails a very fatiguing journey to reach, few archæologists have had the temerity to undertake the journey, and very few Englishmen have seen it. At a first view it is a very staggering example, but on investigation its simple history unfolds itself in a convincing manner, and quite upsets Mr. Fergusson's conclusions. In brief, it is an ancient sepulchre which has been altered and converted to another use many centuries later. The covering stone is the only remaining relic of the primitive building, and there are incised designs upon its under surface, which point to its early age and use. These designs have only been recently noticed, and the tale they disclose is unmistakeable. This monument was most certainly not a "free-standing" one in the sense implied by Mr. Fergusson, nor was it originally erected at the period he supposes.

The "free-standing" theory, having been adopted, required further confirmation than the external appearance of the monuments was supposed to give it, and its advocates have considered that it is strengthened by the "impossibility of accounting for the disappearance of the mounds," and Mr. Fergusson has followed in the wake of Baron Bonstetten,* whose accuracy of observation does not seem to have been of a high order, and has adopted his language. The Baron says that both Brittany and the Department of the Lot are "pays à dolmens appa-rens par excellence," by which he means, as he afterwards shows, dolmens which are now as they have always been. This observation proves that he must have given them a very cursory examination. His objection to the tumular belief is thus stated:—"Les dolmens se rencontrent les plus souvent dans des landes incultes et impropres aux défrichements par la nature même du sol. D'ailleurs, dans un but de nivellement on ne se bornerait pas à enlever le tumulus, mais on détruirait encore le dolmen. Les pierres seraient utilisées ou on les enfouirait assez profondément en terre pour qu'elles ne heurtent pas le soc de la charrue," pp. 7, 8. This objection he applies to both the Brittany and the Lot monuments; but what are the real facts? Very many, indeed the larger number, of the dilapidated or partially covered monuments of Brittany are not far from habitations, and although they may

* "Essai sur les dolmens," Geneva, 1865.

stand on uncultivated plots of ground, are surrounded by cultivated lands which are inclosed by loose stone walls. Again, numbers of chambered mounds have been wholly swept away and the materials utilised within the memory of man. Others have been partially removed, and the stone chambers reduced to ruinous heaps; and in some cases, as is well known, deep holes have been dug, and the obstructing blocks buried. And this work of destruction, which is still going on in spite of the prohibitions of the French Government and the legal penalties threatened, has been in operation for centuries. Ought not the knowledge of these facts to have been acquired by the authors, and have made them hesitate before attempting to classify monuments according to their present aspects, without carefully taking into account every possible circumstance connected with the past history of the localities in which they are situated?

Another Continental writer* has fallen into the like errors through the objectionable practice of following in the track of other authors, and seeing with others' eyes. M. da Costa, following the lead of Baron de Bonstetten, has adopted the classification of these monuments into (1) "dolmens apparentes," (2) "dolmens occultos," and (3) "dolmens construidos sobre um monticulo artificial," against which last class we shall raise a vehement protest by and by.

It results from what has been said, that what is really needed when treating of rude stone monuments is perfect accuracy of description and no omission of any detail or feature which may reasonably be supposed to be connected with the structures. Important omissions of this nature frequently occur, not intentionally, but because of the defective archæological education of the writers, and their want of experience. It is very damaging to the cause of scientific truth when such a theory as the one here exposed is asserted to be supported by examples which really tell against it. Our antiquarian ancestors, who knew very little respecting these monuments, and had few opportunities of comparing them with others in distant localities, who did not know what their true construction and destination were, and mistook the weathering effects on the capstones for channels artificially made, called these structures Druids' Altars, and invented horrible stories of human sacrifices. Assuredly, if it be once admitted that there were "free-standing" monuments which were never inclosed in mounds, then their views may not have been so very far wrong, and some of these buildings may, after all, have been erected for altars of sacrifice. There would be very little proof that they were intended for burial-places. The difference between them (especially those which one author describes as resembling "three-legged milking stools," and another calls "tripod dolmens") and the carefully covered ones, out of whose vaults the earth of the mounds is thoroughly excluded by means of walls of dry masonry, is so great and so striking that the exposed ones could scarcely be with any certainty declared to have been tombs. There is abundant evidence betokening what the covered ones were destined for, and hardly more than a mere assumption as regards the others.

W. C. LUKIS

(To be continued.)

NOTES

As usual at this season, scientific congresses are coming thick upon us. The British Association commences its sittings next Wednesday at Belfast, when Prof. Tyndall will give his presidential address. The French Association, as we have said in another column, holds its session at Lille contemporaneously with our own. The British Medical Association commenced its

yearly meeting at Norwich on Tuesday, when Dr. Copeman, the president, gave his address; and the British Pharmaceutical Conference brought its eleventh annual meeting to a close in London on Saturday last. The tone of the presidential address by Mr. T. B. Groves, F.C.S., at the last-mentioned meeting, as well as that of Mr. F. J. Bramwell, F.R.S., on the 4th inst. at Cardiff, to the Institution of Mechanical Engineers, was, we are glad to see, decidedly in favour of a more thorough education of those who desire to enter upon these callings in the scientific principles which underlie Pharmacy and Mechanical Engineering. The British Archæological Association at Bristol have been working hard and well in their own interesting department. It has become the fashion in certain quarters to speak slightly of these annual meetings as being meetings for mere talk and enjoyment; they may be so, but it seems to us that, on the whole, the proceedings prove that much really good hard work is being done year after year in all scientific departments; and it is surely something gained that scientific congresses should have come to be regarded as "popular," and should have all the important cities in the kingdom eager for the honour of their presence.

THE following are the titles of the Evening Discourses to be given at the Belfast meeting of the British Association:—Friday, Aug. 21, by Sir John Lubbock, Bart., F.R.S., "On common Wild Flowers considered in relation to Insects;" Monday, Aug. 24, by Prof. Huxley, Sec. R.S., "On the hypothesis that Animals are Automata; and its history."

THE following foreigners and members of the British Association, among others, have signified their intention of being present at the meeting in Belfast:—Dr. Schweinfurth, Prof. Knoblauch, Prof. Gluge, M. Khanikof, Prof. Delffs, M. Bréguet, Prof. Stoletoff, M. Mannoir, Dr. Williamson, Dr. Hooker, Prof. Stokes, Prof. Adams, Dr. Tyndall, Lord Rosse, Prof. Tait, Prof. Clerk Maxwell, Prof. F. Fuller, Lord Enniskillen, Lord O'Hagan, Prof. Jellett, Mr. Huggins, Dr. Balfour, Dr. Carpenter, Prof. Huxley, Dr. Crum Brown, Prof. Herschel, Prof. W. G. Adams, Mr. Stoney, Dr. Roscoe, Dr. Maxwell Simpson, Prof. G. Foster, Mr. Young, Prof. Hull, Prof. Geikie, Prof. Harkness, Major Wilson, Dr. Odling, Sir John Lubbock, Mr. Bramwell, Prof. James Thomson, Mr. Crookes, Dr. Gwyn Jeffreys, Admiral Ommaney, General Strachey, General Smythe, Col. Strange, Capt. Galton, Mr. Spottiswoode, Prof. Michael Foster, Mr. Ray Lankester, Prof. Clifford, Mr. T. W. Glaisher, Mr. F. Galton, Dr. Pye Smith, Mr. Rodwell, Mr. Chandler Roberts, Prof. Rowney, Prof. Corfield, Dr. W. Farr, Col. Grant, General Alexander, Col. Home, General Jenkins, Capt. Jenkins, Lieut. Conder, Major St. John, Dr. Debus, Mr. Paxton, Mr. Seeley, Prof. Thorpe, Prof. Thiselton Dyer, Mr. Miall, Mr. Symes, Mr. Corbett, Mr. Shoolbred, Mr. Thomas, &c.

DR. COPEMAN, in his presidential address at the Norwich meeting of the British Medical Association, spoke of the impossibility of regular practitioners being able to engage in pure scientific research. "All persons engaged in physiological research," he said, "ought to be provided with sufficient means to enable them to devote their whole time and attention to their work, without the cares and troubles of practice; while, on the other hand, those who were engaged in the great and paramount object of curing disease could not possibly spare the necessary time for minute physiological investigations. Each, however, could materially assist the other; the practitioner could furnish facts and observations which might greatly assist the physiologist in his experiments, and the latter could enlighten the former by giving reasons for the facts presented to his notice. The majority of medical men must be practitioners and earn their living by practice; but he hoped that in a society like the British Medical Association means would before long be found to supply the

* "Descripcao de alguns Dolmens ou Antas de Portugal," por F. A. Pereira da Costa. (Lisboa, 1868.)